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 d his
     (FILE 'USPAT' ENTERED AT 18:05:14 ON 08 JUL 94)
L1             92 S SUBBAND(1A)COD?
L2              2 S BLOCK LENGTH(1A)DECI?
L3            854 S BLOCK LENGTH OR L2
L4             37 S ADAPTIVE BIT#(1A)ALLOCAT?
L5             24 S ALLOW? NOISE LEVEL
L6         112984 S INDEX
L7              8 S L1 AND L3
L8              6 S L4 AND L7
L9              1 S L5 AND L8
L10             0 S L6 AND L9
L11            28 S MINIMUM AUDIBLE
L12             1 S L8 AND L11
L13             0 S L12 AND L6
=> d l12 cls,kwic
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5,268,685 [IMAGE AVAILABLE]    2 CLASSIFICATIONS       L12: 1 of 1

     1.   341/76          OR
     2.   381/30          XR

US PAT NO:     5,268,685 [IMAGE AVAILABLE]                 L12: 1 of 1

ABSTRACT:
A . . . to the determined transient states, or any similar meth
od,
alters the quantizing bit numbers allocated to each block by an
**adaptive** **bit** **allocation** circuit. The allocated bit num
bers
are altered depending upon the transient state of each block to im
prove
the signal-to-noise ratio. . .

SUMMARY:

BSUM(12)

 This . . . signal into signal components in plural frequency r
anges,
orthogonally transforms the signal components in the respective fr
equency
ranges and applies **adaptive** **bit** **allocation** to them to
quantize them. The apparatus is capable of effectively reducing
quantizing noise for which no effective masking is. . .

DRAWING DESC:

DRWD(7)

 FIG. 6 shows a **minimum** **audible** level curve synthesized wi

th a
masking spectrum.

DETDESC:

DETD(3)

In . . . human sense of hearing. This will be described in det
ail
below. This technique uses a combination of the technologies of
**subband** division **coding** (SBC), adaptive transform coding (
ATC),
and **adaptive** **bit** **allocation** (APC-AC).

DETDESC:

DETD(6)

A . . . shown in FIG. 2, the bandwidth of the signal component
s is
broadened and the time resolution is increased (i.e., the **block*
*
**length** is reduced) with increasing frequency of the frequency
range.
In the low frequency range of 0 Hz to 5 kHz,. . .

DETDESC:

DETD(9)

The . . . FFT processing by the FFT circuits 13, 14 and 15 is
grouped
into critical bands, and is sent to the **adaptive** **bit**
**allocation** circuit 18. The audio frequency range is divided in
to
critical bands to take account of the frequency resolution charact
eristic
of. . .

DETDESC:

DETD(10)

The . . . The spectral data in the critical band is requantize
d using
the bit number allocated to the critical band by the **adaptive**
**bit**
**allocation** circuit 18. The quantized spectral data is fed to t
he
output terminal 19.

DETDESC:

DETD(11)

The . . . transient detector output. This alters, by increasin
g or
decreasing, the allocated bit numbers allocated to each critical b
and by
the **adaptive** **bit** **allocation** circuit 18.

DETDESC:

DETD(36)

The . . . between the energy of each band and the allowed nois
e
level. The allocated bit number information is sent to the **adapt
ive**
**bit** **allocation** circuit 18, which quantizes the spectral da
ta
generated by the FFT circuits 13, 14 and 15 using the bit number.
. .

DETDESC:

DETD(37)

The **adaptive** **bit** **allocation** circuit 18 quantizes the
spectral data in each critical band using bit numbers allocated de
pending
on the difference between the. . .

DETDESC:

DETD(38)

The synthesis circuit 27 synthesizes data indicating the so-calle
d
**minimum** **audible** level curve RC and the masking spectrum MS
, as
shown in FIG. 6. The **minimum** **audible** level curve is anothe
r
characteristic of the human sense of hearing and is generated by t
he
**minimum** **audible** level curve generator 32. If the absolute
noise
level is below the **minimum** **audible** level curve, this noise
cannot
be heard. For a given quantization, the **minimum** **audible** le
vel
curve varies, depending on the loudness level when the signal is

reproduced. However, since the manner in which music. . . band in the
vicinity of 4 kHz, it can be assumed that quantization noise less than
the level of the **minimum** **audible** curve will be inaudible i n other
frequency bands. Accordingly, when the noise level in the vicinity of 4
kHz corresponding. . . the word length set by the system is not heard,
the allowed noise level can be provided by synthesizing the **mini mum**
**audible** curve RC and the masking spectrum MS. The resulting al lowed
noise level in each critical band may be up to the level indicated by the
cross-hatched portion in FIG. 6. In this embodiment, the level of the
**minimum** **audible** curve at 4 kHz is set to correspond to the
minimum level corresponding to quantizing using, e.g., 20 bits. FI G.. .
.

DETDESC:

DETD(40)

The . . . correction is made is as follows: there are instance s where
the total number of bits allocated by applying a temporary **adapt ive**
**bit** **allocation** to all blocks to which bits are to be alloc ated
may be in error with respect to the number of. . .

DETDESC:

DETD(43)

The . . . at the same intensity as that of a pure sound at 1 k Hz. The
equi-loudness curve is similar to the **minimum** **audible** leve l curve
RC shown in FIG. 6. In the equi-loudness curve, for example, a sou nd in
the vicinity of 4. . .

DETDESC:

DETD(44)

It . . . processing apparatus for compressing a digital speech signal
or a digital video signal, etc Further, the synthesis processing f or the
**minimum** **audible** level curve may be omitted. In this case,
**minimum** **audible** level curve generator 32 and synthesis cir cuit 27
are unnecessary, and the output of the subtractor 24 is deconvolut ed by.
. .

CLAIMS:

CLMS(3)

3. The apparatus of claim 1, wherein:
each block has a **block** **length**; and
the time dividing means divides the signal components in time int o
blocks so that block lengths decrease with increasing frequency.
. .
=> d l9 cls,kwic

5,268,685 [IMAGE AVAILABLE] 2 CLASSIFICATIONS L9: 1 of 1

| | | |
|---|---|---|
| 1. | 341/76 | OR |
| 2. | 381/30 | XR |

US PAT NO: 5,268,685 [IMAGE AVAILABLE] L9: 1 of 1

ABSTRACT:
A . . . frequency bands, and are also sent to a transient detec tor,
which determines a transient state for each blocks. Changing an
**allowed** **noise** **level** calculating circuit in response to the
determined transient states, or any similar method, alters the qua ntizing
bit numbers allocated to each block by an **adaptive** **bit**
**allocation** circuit. The allocated bit numbers are altered depe nding
upon the transient state of each block to improve the signal-to-no ise
ratio. . .

SUMMARY:

BSUM(12)

This . . . signal into signal components in plural frequency r anges,

orthogonally transforms the signal components in the respective fr
equency
ranges and applies **adaptive** **bit** **allocation** to them to
quantize them. The apparatus is capable of effectively reducing
quantizing noise for which no effective masking is. . .

DRAWING DESC:

DRWD(4)

FIG. 3 is a block diagram showing an example of the **allowed**
**noise** **level** calculating circuit 20 in the apparatus shows
in FIG.
1.

DETDESC:

DETD(3)

In . . . human sense of hearing. This will be described in det
ail
below. This technique uses a combination of the technologies of
**subband** division **coding** (SBC), adaptive transform coding (
ATC),
and **adaptive** **bit** **allocation** (APC-AC).

DETDESC:

DETD(6)

A . . . shown in FIG. 2, the bandwidth of the signal component
s is
broadened and the time resolution is increased (i.e., the **block*
*
**length** is reduced) with increasing frequency of the frequency
range.
In the low frequency range of 0 Hz to 5 kHz,. . .

DETDESC:

DETD(9)

The . . . FFT processing by the FFT circuits 13, 14 and 15 is
grouped
into critical bands, and is sent to the **adaptive** **bit**
**allocation** circuit 18. The audio frequency range is divided in
to
critical bands to take account of the frequency resolution charact
eristic
of. . .

DETDESC:

DETD(10)

The **allowed** **noise** **level** calculating circuit 20 calcul
ates an
**allowed** **noise** **level** for each critical band on the basi
s of
the spectral data in the critical band, taking account of masking.
 Then,
an allocated bit number is calculated for each critical band on th
e basis
of the **allowed** **noise** **level** and the energy or the peak
value
in the critical band. The spectral data in the critical band is
requantized using the bit number allocated to the critical band by
 the
**adaptive** **bit** **allocation** circuit 18. The quantized spec
tral
data is fed to the output terminal 19.

DETDESC:

DETD(11)

The **allowed** **noise** **level** calculating circuit 20 is sup
plied
with the output of the transient detector 17. The **allowed** **no
ise**
**level** calculating circuit corrects the **allowed** **noise**
**level** for each critical band in response to the transient dete
ctor
output. This alters, by increasing or decreasing, the allocated bi
t
numbers allocated to each critical band by the **adaptive** **bit*
*
**allocation** circuit 18.

DETDESC:

DETD(24)

FIG. 3 is a block diagram showing the configuration of a practica
l
example of the **allowed** **noise** **level** calculating circuit
 20. In
FIG. 3, the input terminal 21 is supplied with the spectral data i
n the
frequency domain. . .

DETDESC:

DETD(29)

The . . . is fed into the subtractor 24. The subtractor 24 det
ermines
a level .alpha. in the convoluted region corresponding to the **al
lowed**
**noise** **level**. This will be described later. The level .alph
a.
corresponding to the **allowed** **noise** **level** is the level
that
will become the **allowed** **noise** **level** in each critical b
and
after carrying out the deconvolution processing that will be descr
ibed
below.

DETDESC:

DETD(31)

When . . . the critical band is i, the number of the lowest-fr
equency
critical band being 1, the level .alpha. corresponding to the **al
lowed**
**noise** **level** is determined by the following equation:

DETDESC:

DETD(36)

The . . . by the allowed noise corrector 30. The corresponds t
o the
level difference between the energy of each band and the **allowed
**
**noise** **level**. The allocated bit number information is sent
to the
**adaptive** **bit** **allocation** circuit 18, which quantizes th
e
spectral data generated by the FFT circuits 13, 14 and 15 using th
e bit
number. . .

DETDESC:

DETD(37)

The **adaptive** **bit** **allocation** circuit 18 quantizes the
spectral data in each critical band using bit numbers allocated de
pending
on the difference between the energy of each critical band and the

respective **allowed** **noise** **level**. The delay circuit 29 i
s
provided to delay the bark spectrum SB from the energy calculating
circuit 22 to take. . .

DETDESC:

DETD(38)

The . . . level in the vicinity of 4 kHz corresponding to the
word
length set by the system is not heard, the **allowed** **noise**
**level** can be provided by synthesizing the minimum audible curv
e RC
and the masking spectrum MS. The resulting **allowed** **noise**
**level** in each critical band may be up to the level indicated b
y the
cross-hatched portion in FIG. 6. In this. . .

DETDESC:

DETD(39)

The **allowed** **noise** **level** corrector 30 corrects the
**allowed** **noise** **level** at the output of the subtractor 28
in
response to information sent from the correction information outpu
t
circuit 33. The. . . state determined by the transient detector
17 for
the signal component in each block shown in FIG. 2. Thus, the **al
lowed**
**noise** **level** a the output of the subtractor 28 is corrected
so
that the bit allocation for each block is corrected according. .
.

DETDESC:

DETD(40)

The **allowed** **noise** **level** is corrected in response to
information indicating an error between the detected quantity of o
utput
bits used for quantizing by. . . correction is made is as follo
ws:
there are instances where the total number of bits allocated by ap
plying
a temporary **adaptive** **bit** **allocation** to all blocks to w
hich
bits are to be allocated may be in error with respect to the numbe

r of.
. .

DETDESC:

DETD(41)

To . . . the correction information output circuit 33 provides
, in
response to the error, data indicating a correction value to corre
ct the
**allowed** **noise** **level** at the output of the subtractor 28
, e.g.,
in response to mode information indicating the transient state of
each
block. The correction value described above is transmitted to the
allowed
noise corrector 30 to correct the **allowed** **noise** **level**
at the
output of the subtractor 28.

DETDESC:

DETD(42)

The correction information output circuit 33 can also provide cor
rection
information based on the so. called equi-loudness curve. The **all
owed**
**noise** **level** at the output of the subtractor 28 is correcte
d in
response to correction information that takes account of modes
indicating. . .

DETDESC:

DETD(43)

The . . . kHz sound to be perceived as having at the same inte
nsity
as the 1 kHz sound. For this reason, the **allowed** **noise** **l
evel**
should have a frequency characteristic given by a curve correspond
ing to
the equi-loudness curve. It can be seen that correcting the **allo
wed**
**noise** **level** by taking the equi-loudness curve into conside
ration
adapts the system to the characteristics of the human sense of hea
ring.

CLAIMS:

CLMS(3)

3. The apparatus of claim 1, wherein:
each block has a **block** **length**; and
the time dividing means divides the signal components in time int
o
blocks so that block lengths decrease with increasing frequency.
. .

CLAIMS:

CLMS(4)

4. . . .
critical bands, and
the bit allocating means allocates a quantizing bit number for ea
ch
critical band on the basis of an **allowed** **noise** **level**
for
each critical band.

CLAIMS:

CLMS(6)

6. The apparatus of claim 4, wherein the bit number altering mean
s
alters the bit numbers by changing the **allowed** **noise** **lev
el** in
response to the transient state determined by the transient state
determining means.

CLAIMS:

CLMS(10)

10. . . .
into critical bands;
the bit allocation means allocates a quantizing bit number for ea
ch
critical band on the basis of an **allowed** **noise** **level**
for
each critical band; and
bit number altering means alters the bit number by changing the
**allowed** **noise** **level** in response to the mode number f
or each
block.

CLAIMS:

CLMS(15)

15. . . .
into critical bands;
the bit allocation means allocates a quantizing bit number for ea
ch
critical band on the basis of an **allowed** **noise** **level**
for
each critical band; and
the bit number altering means alters the bit allocation by changi
ng the
**allowed** **noise** **level** in response to the mode number f
or each
block.

=> d l8 cit 1-6

1. 5,297,236, Mar. 22, 1994, Low computational-complexity digital
filter
bank for encoder, decoder, and encoder/decoder; Michael B. Antill,
et
al., 395/2.12 [IMAGE AVAILABLE]

2. 5,268,685, Dec. 7, 1993, Apparatus with transient-dependent bi
t
allocation for compressing a digital signal; Yoshihito Fujiwara, 3
41/76;
381/30 [IMAGE AVAILABLE]

3. 5,230,038, Jul. 20, 1993, Low bit rate transform coder, decode
r, and
encoder/decoder for high-quality audio; Louis D. Fielder, et al.,
395/2;
381/35, 36, 37 [IMAGE AVAILABLE]

4. 5,222,189, Jun. 22, 1993, Low time-delay transform coder, deco
der,
and encoder/decoder for high-quality audio; Loius D. Fielder, 395/
2;
381/30; 395/2.38, 2.39 [IMAGE AVAILABLE]

5. 5,142,656, Aug. 25, 1992, Low bit rate transform coder, decode
r, and
encoder/decoder for high-quality audio; Louis D. Fielder, et al.,
381/37
[IMAGE AVAILABLE]

6. 5,109,417, Apr. 28, 1992, Low bit rate transform coder, decode
r, and
encoder/decoder for high-quality audio; Louis D. Fielder, et al.,
381/36;

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364/715.04, 748; 375/122; 381/29 [IMAGE AVAILABLE]=> d his
     (FILE 'USPAT' ENTERED AT 18:05:14 ON 08 JUL 94)
L1             92 S SUBBAND(1A)COD?
L2              2 S BLOCK LENGTH(1A)DECI?
L3            854 S BLOCK LENGTH OR L2
L4             37 S ADAPTIVE BIT#(1A)ALLOCAT?
L5             24 S ALLOW? NOISE LEVEL
L6         112984 S INDEX
L7              8 S L1 AND L3
L8              6 S L4 AND L7
L9              1 S L5 AND L8
L10             0 S L6 AND L9
L11            28 S MINIMUM AUDIBLE
L12             1 S L8 AND L11
L13             0 S L12 AND L6
L14           499 S BIT(1A)ALLOCAT?
L15           873 S BIT#(1A)ALLOCAT?
L16           873 S L14 OR L15
L17            46 S L11 OR L5
L18             1 S L8 AND L17
L19             1 S L7 AND L17
L20             0 S L6 AND L19
L21            32 S L6 AND L1
L22            14 S L16 AND L21
L23             1 S L22 AND L17
=> d l18 cit

1.  5,268,685, Dec. 7, 1993, Apparatus with transient-dependent bi
t
allocation for compressing a digital signal; Yoshihito Fujiwara, 3
41/76;
381/30 [IMAGE AVAILABLE]
=> d l19 cit

1.  5,268,685, Dec. 7, 1993, Apparatus with transient-dependent bi
t
allocation for compressing a digital signal; Yoshihito Fujiwara, 3
41/76;
381/30 [IMAGE AVAILABLE]
=> d l23 cit

1.  5,294,925, Mar. 15, 1994, Data compressing and expanding appar
atus
with time domain and frequency domain block floating; Kenzo Akagir
i,
341/50; 381/37 [IMAGE AVAILABLE]
=>
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